

WHAT IS CLAIMED IS:

1. An apparatus for recovering fluids from a subsea well located at a water depth of at least about 1,500 feet from a surface location, said apparatus comprising:

5 a fluid separator having a nominal vertical dimension larger than a nominal horizontal dimension, said fluid separator capable of operating at an internal pressure of no more than about half of the external pressure and having at least two fluid outlets and one multi-phase fluid inlet;

10 a transducer producing a signal that is at least in part dependent upon a fluid interface level within said fluid separator;

15 an upper, less-dense fluid outlet of said fluid separator fluidly connected to a riser assembly that extends from said fluid separator to a near surface location;

20 a hydraulically-driven pump fluidly connected to a lower, more-dense fluid outlet of said fluid separator, wherein the operational speed of said hydraulically driven pump is at least in part controlled by said signal produced by said transducer.

2. The apparatus of Claim 1 wherein said hydraulically driven pump is located outside of said fluid separator.

3. The apparatus of Claim 2 wherein said riser assembly and said fluid separator are composed of tubular sections and wherein said fluid separator has a nominal diameter of no more than about 36 inches.

4. The apparatus of Claim 3 wherein said fluid separator and said riser assembly have nominal internal diameters of at least about 12 inches.

5. The apparatus of Claim 4 which also comprises a removable mixed fluid inlet.

6. The apparatus of Claim 5 wherein said fluid separator has a nominal internal diameter of no more than about 30 inches.

7. The apparatus of Claim 6 wherein said fluid separator has a vertical height of about at least 30 feet.

8. The apparatus of Claim 7 wherein said fluid separator has a vertical height of about at least 50 feet.

9. The apparatus of Claim 8 wherein said fluid separator has a vertical height of about at least 80 feet.

10. The apparatus of Claim 9 wherein said hydraulic pump and a liquid-level interface within said fluid separator form a partially self-regulating liquid-level interface controller.

11. The apparatus of Claim 10 wherein said separator is capable of operating at an internal pressure of 500 psi or less.

12. The apparatus of Claim 11 wherein said separator is capable of operating at an internal pressure of 200 psi or less.

13. An apparatus for separating fluids from a multi-phase fluid source, said apparatus located at a water depth of at least about 1,500 feet from a surface location, said apparatus comprising:

5 a fluid separator capable of operating at an internal pressure of about $\frac{1}{2}$ of the external pressure or less and having a nominal vertical dimension larger than a nominal horizontal dimension, said fluid separator comprising well
10 tubular sections and having at least two fluid outlets and at least one inlet fluidly connected to said multi-phase fluid source;

 an upper fluid outlet of said fluid separator fluidly connected to a riser assembly that extends
15 from said fluid separator to a near-surface location; and

 a centrifugal pump fluidly connected to a lower fluid outlet of said fluid separator, wherein
20 the operational speed of said pump is at least in part controlled by a fluid level interface within said fluid separator.

14. The apparatus of Claim 13 wherein said pump is a hydraulic pump located outside of said fluid separator.

15. The apparatus of Claim 14 wherein said pump is capable of operating when the height of said fluid level interface within said fluid separator varies by as much as 40 feet.

16. The apparatus of Claim 15 wherein said riser comprises at least two concentric conduits.

18. The apparatus of Claim 16 wherein the nominal diameter of said fluid separator is about 4 feet or less.

19. A process for recovering fluids from a subsea well comprising:

fluidly connecting said subsea well to a fluid inlet of a subsea vertical separator;

5 fluidly connecting a riser assembly to an upper fluid outlet of said subsea vertical separator;

10 fluidly connecting a hydraulically-driven pump to a lower outlet of said subsea vertical separator;

determining a fluid level within said subsea vertical separator; and

15 controlling the internal pressure within said vertical separator to $\frac{1}{2}$ the external pressure or less and controlling the operational speed of said

hydraulically-driven pump using at least in part
said determined fluid level.

20. The process of Claim 19 wherein said
controlling step uses at least in part a self-regulating
output characteristic of said hydraulically driven pump
and said hydraulically driven pump has a response time
5 of at least 20 seconds in response to changes in liquid
interface level within said vertical separator.